Lung cancer patients who receive intensity modulated radiation therapy (IMRT) have less inflammation and better tolerance of follow-up chemotherapy

Secondary analysis of NRG/RTOG 0617 compares IMRT to conventional RT

San Antonio, October 18, 2015—Patients with stage III non-small cell lung cancer (NSCLC) who receive intensity modulated radiation therapy (IMRT) have 44 percent fewer cases of severe pneumonitis and improved likelihood of completing consolidative chemotherapy after radiation, compared to patients who receive three-dimensional conformal radiation therapy (3-D CRT), according to research presented today at the American Society for Radiation Oncology’s (ASTRO’s) 57th Annual Meeting.

The standard of care for patients with locally-advanced (stage III) lung cancer is concurrent chemotherapy with radiation therapy (RT). Two different types of RT are typically used to treat these patients: 3-D CRT and IMRT. Although IMRT is a more advanced and more expensive form of RT, it can target treatment to lung tumors while minimizing radiation exposure of sensitive organs like the
lungs and heart from high radiation doses.

This study is a secondary analysis of the data compiled from NRG/RTOG 0617 to compare the use of IMRT and 3-D CRT in patients with lung cancer. NRG/RTOG 0617 was a large, multi-institutional phase III, randomized clinical trial of patients with locally-advanced non-small cell lung cancer (NSCLC) conducted from 2007 to 2011. The original study compared a high-dose of 74 Gy to a standard dose of 60 Gy. All patients received concurrent chemotherapy consisting of carboplatin/paclitaxel and were randomized to be treated with or without cetuximab.

Of the 482 patients treated with RT, 47 percent were treated with IMRT and 53 percent were treated with 3-D CRT. Because the original trial design was not randomized for radiation technique, the IMRT group had larger and more advanced-stage tumors. Data indicated that 38.6 percent of the IMRT group had stage IIIB tumors, compared to 30.3 percent of the 3-D CRT group.

The study results showed that although the IMRT patients had more advanced tumors, they had a lower occurrence of severe pneumonitis (for this study, this was defined as lung inflammation that required oxygen, steroids, or mechanical ventilation; and/or led to death) than patients who had been treated with 3-D CRT. Data indicated that 3.5 percent of IMRT patients had severe pneumonitis compared to 7.9 percent of the 3-D CRT patients (P = 0.046). IMRT remained associated with less severe pneumonitis in multivariate analysis (HR 0.44, P=0.0653), and was particularly pronounced in large tumors that were bigger than the median size of 460 mL (HR 0.22, P = 0.02). IMRT was also associated with significantly lower doses of radiation delivered to the heart which were highly associated with patient survival. Additionally, patients treated with IMRT were more likely to complete high-dose consolidative chemotherapy than patients treated with 3-D CRT (37 percent versus 29 percent, P = 0.051).

“We looked at one of the largest clinical trials ever done for locally-advanced NSCLC and found that the most important factors associated with severe pneumonitis were IMRT technique and the lung V20. The low dose bath such as the lung V5 was not associated with any toxicity outcome. These findings have the potential to fundamentally change the way we deliver radiation therapy for locally-advanced lung cancer,” said Stephen Chun, MD, lead author of the study and Fellow in the
Department of Radiation Oncology at The University of Texas MD Anderson Cancer Center in Houston. “By reducing severe life threatening pneumonitis, IMRT has the potential to improve patients’ quality of life, reduce hospital/intensive care unit admissions, and decrease supplemental oxygen use. In our study, it seemed that IMRT might also facilitate patients being able to tolerate higher doses of consolidative chemotherapy which are standard after radiation.”

The abstract, “Comparison of 3-D Conformal and Intensity Modulated Radiation Therapy Outcomes for Locally Advanced Non-Small Cell Lung Cancer in NRG Oncology/RTOG 0617” will be presented in detail during a scientific session at ASTRO’s 57th Annual Meeting at 3:15 p.m. Central time on Sunday, October 18, 2015. To speak with Dr. Chun, please call ASTRO’s Press Office at the Henry B. González Convention Center, in San Antonio on October 18 – 21, 2015 at 210-258-8104 or 210-258-8105, or email press@astro.org.

ASTRO’s 57th Annual Meeting, being held at the Henry B. González Convention Center in San Antonio, October 18-21, 2015, is the nation’s premier scientific meeting in radiation oncology. The 2015 Annual Meeting is expected to attract more than 11,000 attendees including oncologists from all disciplines, medical physicists, dosimetrists, radiation therapists, radiation oncology nurses and nurse practitioners, biologists, physician assistants, practice administrators, industry representatives and other health care professionals from around the world. Led by ASTRO President Bruce D. Minsky, MD, FASTRO, a radiation oncologist specializing in gastrointestinal cancers, Professor of Radiation Oncology, and the Frank T. McGraw Memorial Chair at The University of Texas MD Anderson Cancer Center, Houston, the theme of the 2015 Meeting is “Technology Meets Patient Care.” Dr. Minsky’s Presidential Symposium, “Multidisciplinary Management of Esophageal and Rectal Cancers,” will feature Leonard L. Gunderson, MD, MS, FASTRO, and Joel E. Tepper, MD, FASTRO, to highlight imaging, staging, genomics and data mining approaches, as well as the latest advances in esophageal and colorectal cancer treatment. ASTRO’s four-day scientific meeting includes presentation of more than 2,100 abstracts: five plenary papers, 351 oral presentations, 1,609 posters and 171 digital posters in more than 53 educational sessions and 26 scientific panels for 20 disease-site tracks. Three keynote speakers will address a range of topics including cancer biology in
radiation oncology, the essential roles of a physician, and patient safety: Arul Chinnaiyan, MD, PhD, Professor and Director, Michigan Center for Translational Pathology; Francisco G. Cigarroa, MD, Past President and Chancellor, University of Texas; and Gerald B. Hickson, MD, Senior Vice President and Assistant Vice Chancellor, Vanderbilt University Medical Center.

ABOUT ASTRO

ASTRO is the premier radiation oncology society in the world, with more than 10,000 members who are physicians, nurses, biologists, physicists, radiation therapists, dosimetrists and other health care professionals who specialize in treating patients with radiation therapies. As the leading organization in radiation oncology, the Society is dedicated to improving patient care through professional education and training, support for clinical practice and health policy standards, advancement of science and research, and advocacy. ASTRO publishes two medical journals, International Journal of Radiation Oncology • Biology • Physics (www.redjournal.org) and Practical Radiation Oncology (www.practicalradonc.org); developed and maintains an extensive patient website, www.rtanswers.org; and created the Radiation Oncology Institute (www.roinstitute.org), a non-profit foundation to support research and education efforts around the world that enhance and confirm the critical role of radiation therapy in improving cancer treatment. To learn more about ASTRO, visit www.astro.org.

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2015 American Society for Radiation Oncology (ASTRO) 57th Annual Meeting
News Briefing, Monday, October 19, 2015, 10:30 a.m., Central time

Scientific Session: Sunday, October 18, 2015, 3:15 – 4:45 p.m., CT, the Henry B. González Convention Center

2 Comparison of 3-D Conformal and Intensity Modulated Radiation Therapy Outcomes for Locally Advanced Non-Small Cell Lung Cancer in NRG Oncology/RTOG 0617

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Purpose/Objective(s): Intensity modulated radiation therapy (IMRT) is being increasingly used for locally-advanced non-small cell lung cancer (NSCLC) as a measure to improve target coverage and spare toxicity. Outcomes of IMRT compared to 3D-conformal radiation therapy (3D-CRT) for NSCLC have not previously been assessed in a large prospective cooperative group clinical trial.

Materials/Methods: A secondary analysis was performed in patients with stage III NSCLC treated with radiation therapy (RT) in RTOG 0617, a randomized phase III comparison of standard-dose (60 Gy) versus high-dose (74 Gy) chemoradiotherapy +/- cetuximab. RT technique was one of three pre-specified stratification factors. Pre-treatment factors and dosimetric parameters were compared between RT techniques after adjusting for RT dose levels and cetuximab usage. The prognostic value of RT technique with respect to toxicity and efficacy was assessed through multivariate logistic regression and Cox proportional hazards model after controlling for RT dose level, cetuximab use and other prognostic factors.

Results: Among the 482 eligible patients treated with RT, 53% and 47% were treated with 3D-CRT and IMRT, respectively. The IMRT group had more stage IIIB (38.6 vs. 30.3%, P = 0.056), larger PTVs (mean 486 vs. 427 mL, P = 0.005), and larger PTV: lung ratio (mean 0.15 vs. 0.13, P = 0.013). For a given PTV volume, IMRT was associated with lower lung V20 (P = 0.08), and lower heart doses (V5, V20, V40) than 3D-CRT. IMRT was associated with a 2-fold lower rate (3.5 versus 7.9%) of Grade 3+ pneumonitis (P = 0.065). The relative reduction of lung V20 with IMRT was exchanged for significantly larger amounts of low dose (V5) delivered to the lung (62% versus 55%, P < 0.0001). The lung V20 was predictive of grade 3+ pneumonitis, while the lung V5 and mean lung doses were not. Larger heart V40 was associated with worse OS (HR=1.013, P < 0.001), and the heart V40 was significantly lower in patients treated with IMRT. Patients treated with IMRT were also more likely (37 versus 29%) to receive full doses of consolidative chemotherapy (P = 0.05). OS and PFS were similar between IMRT and 3D-CRT.

Conclusion: Although IMRT was used to treat larger and less favorable tumors in RTOG 0617, it was associated with reduced risk of severe pneumonitis and an improved likelihood to receive full doses of consolidative chemotherapy. Lung V20, but not V5, was predictive of severe pneumonitis. The heart V40, shown to be highly prognostic for survival, can be substantially reduced with IMRT compared to 3D-CRT.

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